

AMENDMENTS TO THE CLAIMS

1-33. (Canceled)

34. (Currently Amended) A wireless communication system, comprising:

a control apparatus;

at least one relay apparatus connected with ~~the~~said control apparatus via an optical transmission path; and

a plurality of wireless communication terminals communicating wirelessly with ~~the~~said at least one relay ~~apparatus;~~apparatus, wherein:

~~the~~said control apparatus comprises:

a first optical transmitting section for converting a downstream electric signal into a downstream optical signal and transmitting the downstream optical signal to ~~the~~said at least one relay apparatus via the optical transmission ~~path;~~path; and

a first optical receiving section for converting an upstream optical signal transmitted from ~~the~~said at least one relay apparatus via the optical transmission path into an upstream electric ~~signal;~~signal,

~~the~~said at least one relay apparatus comprises:

a second optical receiving section for converting the downstream optical signal transmitted from ~~the~~said control apparatus via the optical transmission path into the downstream electric signal;

a level control section for attenuating a level of the downstream electric signal so as to narrow a communicable area of said at least one relay apparatus and to allow a level of a wireless signal transmitted by one of said wireless communication terminals existing in the communicable area to be within a predetermined range;

a transmitting/receiving antenna section for transmitting the downstream electric signal converted by ~~the~~said second optical receiving section to ~~the~~said one wireless communication terminal as a wireless signal, and receiving a wireless signal transmitted from ~~the~~said one wireless communication terminal as the upstream electric signal; and

a second optical transmitting section for converting the upstream electric signal received by ~~the~~said transmitting/receiving antenna section into the upstream optical signal and

transmitting the upstream optical signal to ~~the said~~ control apparatus via the optical transmission path; ~~and path.~~

~~the wireless communication system further comprises wireless signal level restriction means for attenuating the level of a wireless signal transmitted or received by the relay apparatus such that a receiving level of the wireless signal received by the relay apparatus is kept within a predetermined range.~~

35. (Currently Amended) A wireless communication system according to claim 34, ~~wherein, wherein when said~~ where the wireless communication terminals each use a respective channel, the predetermined range is smaller than a difference between (a) a leakage ratio which is ~~the a~~ ratio of ~~the a~~ level of a wireless signal using the respective channel with respect to ~~the a~~ level of a frequency component leaking to another channel different from the respective channel, and (b) a signal to noise ratio which is ~~the a~~ ratio of ~~the a~~ level of a leakage signal from a wireless communication terminal using another channel different from the respective channel with respect to the level of the wireless signal using the respective channel.

36. (Currently Amended) A wireless communication system according to claim 34, wherein:
~~the said~~ control apparatus further comprises:
a plurality of ~~the said~~ first optical transmitting sections; and
~~the wireless signal level restriction means is a signal dividing section, provided in the control apparatus, for dividing the downstream electric signal; the said~~ signal dividing section divides the downstream electric signal and thus attenuates ~~the a~~ level of the downstream electric signal so as to narrow a communicable area of ~~the said~~ at least one relay apparatus, and thus allows the level of ~~a the~~ wireless signal transmitted by ~~a said one~~ wireless communication terminal existing in the communicable area to be within the predetermined range; and, wherein
~~the said~~ first optical transmitting sections convert ~~the downstream electric signals divided by the said~~ signal dividing section into downstream optical signals.

37. (Currently Amended) A wireless communication system according to claim 34, wherein:
~~the wireless signal level restriction means is a pilot signal generation section, provided in~~

the control apparatus, is for generating a pilot signal to be transmitted while being superposed on the downstream electric signal;

~~the said~~ first optical transmitting section converts the downstream electric signal having the pilot signal superposed thereon into a downstream optical signal;

~~the said at least one~~ relay apparatus further comprises:

a pilot signal detection section for detecting ~~the a~~ level of the pilot signal superposed on the downstream electric signal converted by ~~the said~~ second optical receiving section; ~~and, wherein said a-level control section for controlling controls the a~~ level of the wireless signal such that the level of the pilot signal detected by ~~the said~~ pilot signal detection section is constant; and

~~the said~~ pilot signal generation section increases the level of the generated pilot signal so as to narrow a communicable area of ~~the said at least one~~ relay apparatus, and thus allows the level of ~~a the~~ wireless signal transmitted by ~~a said one~~ wireless communication terminal existing in the communicable area to be within the predetermined range.

38. (Currently Amended) A wireless communication system according to claim 34, ~~wherein: wherein the a~~ wireless signal level restriction means is provided in ~~the said~~ control apparatus; ~~and and~~ comprises:

a monitoring section for monitoring whether or not ~~the a~~ quality of the upstream electric signal converted by ~~the said~~ first optical receiving section fulfills a predetermined condition; ~~and, wherein a level control section for, when the said monitoring section determines that the quality of the upstream electric signal does not fulfill the predetermined condition, lowering said level control section lowers the level of the downstream electric signal which is to be input to the said first optical transmitting section so as to reduce an optical modulation index; and, and by reducing the level control section reduces the optical modulation index said level control section~~ attenuates the power of the downstream optical signal so as to narrow a communicable area of ~~the said at least one~~ relay apparatus, and thus allows the level of ~~a the~~ wireless signal transmitted by ~~a said one~~ wireless communication terminal existing in the communicable area to be within the predetermined range.

39. (Currently Amended) A wireless communication system according to claim 34, wherein: ~~the~~wherein a wireless signal level restriction means is provided in ~~the~~said control apparatus, ~~and~~ and comprises:

a monitoring section for monitoring whether or not ~~the~~a quality of the upstream electric signal converted by ~~the~~said first optical receiving section fulfills a predetermined condition; ~~and, wherein a level control section for, when the said monitoring section determines that the a quality of the upstream electric signal does not fulfill the predetermined condition, lowering said level control section lowers the a level of a bias current which is set by the said first optical transmitting section so as to reduce an optical modulation index; and, and by reducing the level control section reduces the optical modulation index and thus said level control section~~ attenuates the power of the downstream optical signal so as to narrow a communicable area of ~~the~~said at least one relay apparatus, and thus allows the level of ~~a~~the wireless signal transmitted by ~~a~~said one wireless communication terminal existing in the communicable area to be within the predetermined range.

40. (Currently Amended) A wireless communication system according to claim 34, wherein said control apparatus includes a ~~the~~ wireless signal level restriction means that includes a level attenuation section for attenuating the wireless signal signals to such a level that the upstream optical signal converted by the said second optical transmitting section is not distorted.

41. (Currently Amended) A wireless communication system according to claim 34, wherein: communicable areas of ~~the~~adjacent relay apparatuses ~~adjacent to each other~~ partially overlap each other;

~~the~~said relay apparatuses each comprise level adjustment means for controlling a gain by adjusting the level of the wireless signal transmitted to, and received from, ~~the~~said one wireless communication terminal; and

~~the~~said level adjustment means adjusts the level of the wireless signal, such that a difference between (a) a delay time required for a signal transmitted from ~~the~~said control apparatus to be transmitted via each of ~~the~~said adjacent relay apparatuses onto ~~the~~a wireless communication terminal existing in a region where the communicable areas overlap each other,

and (b) a delay time required for a signal transmitted from ~~the~~ said control apparatus to be transmitted via ~~the~~ a relay apparatus adjacent to ~~the each~~ said adjacent relay apparatus apparatuses onto ~~the~~ said wireless communication terminal existing in the region where the communicable areas overlap each other, is within a predetermined time period.

42. (Currently Amended) A wireless communication system according to claim 41, ~~wherein,~~ wherein two relay apparatuses adjacent to each other ~~is~~ constitute one set, and one set of adjacent relay apparatuses communicate using a frequency which is different from ~~the a~~ frequency used by another set of adjacent relay apparatuses.

43. (Currently Amended) A wireless communication system according to claim 41, wherein ~~the~~ said transmitting/receiving antenna section has a directivity toward ~~a relay apparatus, among the one of two adjacent relay apparatuses, which is~~ said one relay apparatus being connected with the said control apparatus via a longer optical transmission path than the optical transmission path which connects ~~the~~ said control apparatus and ~~the~~ said at least one relay apparatus including ~~the~~ said transmitting/receiving antenna section.

44. (Currently Amended) A wireless communication system according to claim 41, further comprising an optical splitting/coupling section for splitting the optical transmission path which connects ~~the~~ said control apparatus and each of ~~the~~ said relay apparatuses, wherein one end of the split optical transmission path is connected to ~~the~~ said at least one relay apparatus and the other end is connected to another optical splitting/coupling section.

45. (Currently Amended) A wireless communication system according to claim 41, further comprising an optical splitting/coupling section for splitting the optical transmission path which connects ~~the~~ said control apparatus and each of ~~the~~ said relay apparatuses, wherein ~~the~~ said optical splitting/coupling section splits one optical fiber connected to ~~the~~ said control apparatus into at least a predetermined number of optical fibers, and each of the split optical fibers is connected to ~~a relay apparatus~~ one of said relay apparatuses.

46. (Currently Amended) A wireless communication system according to claim 41, wherein ~~the said~~ level adjustment means adjusts the level of the wireless signal such that the delay times are each a maximum delay time tolerated by ~~the said~~ wireless communication system.

47. (Currently Amended) A wireless communication system according to claim 34, wherein:
communicable areas of ~~the adjacent~~ relay apparatuses ~~adjacent to each other~~ partially overlap each other;

~~the said~~ relay apparatuses each comprise optical signal control means for controlling a delay time of the optical signal transmitted to, and received from, ~~the said~~ control apparatus; and

~~the said~~ optical signal control means controls the delay time of the optical signal, such that a difference between (a) a delay time required for a signal transmitted from ~~the said~~ control apparatus to be transmitted via each of ~~the said~~ adjacent relay apparatuses onto ~~the a~~ wireless communication terminal existing in a region where the communicable areas overlap each other, and (b) a delay time required for a signal transmitted from ~~the said~~ control apparatus to be transmitted via ~~the a~~ relay apparatus adjacent to ~~the each relay apparatus~~ said adjacent relay apparatuses onto the wireless communication terminal existing in the region where the communicable areas overlap each other, is within a predetermined time period.

48. (Currently Amended) A wireless communication system according to claim 34, wherein wireless signals used by each of ~~the said~~ plurality of wireless communication terminals have at least two different frequencies.

49. (Currently Amended) A relay apparatus connected with a control apparatus via an optical transmission path and wirelessly communicating with a plurality of wireless communication terminals, ~~the said~~ relay apparatus comprising:

an optical receiving section for converting a downstream optical signal transmitted from ~~the said~~ control apparatus via the optical transmission path into a downstream electric signal;

a level control section for attenuating a level of the downstream electric signal so as to narrow a communicable area of said relay apparatus and to allow a level of a wireless signal transmitted by one of said wireless communication terminals existing in the communicable area

to be within a predetermined range;

a transmitting/receiving antenna section for transmitting the downstream electric signal converted by ~~the~~ said optical receiving section to ~~the~~ said wireless communication terminals ~~to as~~ a wireless signal, and receiving a wireless signal transmitted from ~~the~~ said wireless communication terminals as an upstream electric signal; and

an optical transmitting section for converting the upstream electric signal received by ~~the~~ said transmitting/receiving antenna section into an upstream optical signal and transmitting the upstream optical signal to ~~the~~ said control apparatus via the optical transmission path; and path.

~~wireless signal level restriction means for attenuating the level of a wireless signal transmitted or received by the transmitting/receiving antenna section such that a receiving level of the wireless signal received by the transmitting/receiving antenna section is kept within a predetermined range.~~

50. (Currently Amended) A wireless communication system, comprising:

a control apparatus;

at least one relay apparatus connected with ~~the~~ said control apparatus via an optical transmission path; and

a plurality of wireless communication terminals communicating wirelessly with ~~the~~ said at least one relay apparatus; apparatus, wherein:

~~the~~ said control apparatus comprises:

a first optical transmitter operable to convert a downstream electric signal into a downstream optical signal and transmit the downstream optical signal to ~~the~~ said at least one relay apparatus via the optical transmission path; path; and

a first optical receiver operable to convert an upstream optical signal transmitted from ~~the~~ said at least one relay apparatus via the optical transmission path into an upstream electric signal; signal,

~~the~~ said at least one relay apparatus comprises:

a second optical receiver ~~to~~ operable to convert the downstream optical signal transmitted from ~~the~~ said control apparatus via the optical transmission path into the downstream electric signal;

a level controller operable to attenuate a level of the downstream electric signal so as to narrow a communicable area of said at least one relay apparatus and to allow a level of a wireless signal transmitted by one of said wireless communication terminals existing in the communicable area to be within a predetermined range;

a transmitting/receiving antenna section operable to transmit the downstream electric signal converted by ~~the said~~ second optical receiver to ~~the said one~~ wireless communication terminal as a wireless signal, and receive a wireless signal transmitted from the said one wireless communication terminal as the upstream electric signal; and

a second optical transmitter operable to convert the upstream electric signal received by ~~the said~~ transmitting/receiving antenna section into the upstream optical signal and transmit the upstream optical signal to ~~the said~~ control apparatus via the optical transmission path; ~~and path.~~

~~the wireless communication system further comprises a wireless signal level restrictor operable to attenuate the level of a wireless signal transmitted or received by the relay apparatus such that a receiving level of the wireless signal received by the relay apparatus is kept within a predetermined range.~~

51. (Currently Amended) A wireless communication system according to claim 50, ~~wherein, wherein where~~ when the said wireless communication terminals each use a respective channel, the predetermined range is smaller than a difference between (a) a leakage ratio which is ~~the a~~ ratio of ~~the a~~ level of a wireless signal using the respective channel with respect to ~~the a~~ level of a frequency component leaking to another channel different from the respective channel, and (b) a signal to noise ratio which is ~~the a~~ ratio of ~~the a~~ level of a leakage signal from a wireless communication terminal using another channel different from the respective channel with respect to the level of the wireless signal using the respective channel.

52. (Currently Amended) A wireless communication system according to claim 50, ~~wherein, wherein~~ the said control apparatus further comprises:

a plurality of ~~the said~~ first optical transmitters; and

~~the wireless signal level restrictor is a signal divider, provided in the control apparatus;~~

operable to divide the downstream electric ~~signal; signal, the said~~ signal divider divides the downstream electric signal and thus attenuates ~~the a~~ level of the downstream electric signal so as to narrow a communicable area of ~~the said at least one~~ relay apparatus, and thus allows the level of ~~a the~~ wireless signal transmitted by ~~a said one~~ wireless communication terminal existing in the communicable area to be within the predetermined range; ~~and, wherein the said~~ first optical transmitters convert ~~the~~ downstream electric signals divided by ~~the said~~ signal divider into downstream optical signals.

53. (Currently Amended) A wireless communication system according to claim 50, wherein:

~~the wireless signal level restrictor is a pilot signal generator, provided in the said~~ control apparatus, is operable to generate a pilot signal to be transmitted while being superposed on the downstream electric signal;

~~the said~~ first optical transmitter converts the downstream electric signal having the pilot signal superposed thereon into a downstream optical signal;

~~the said at least one~~ relay apparatus further comprises:

a pilot signal detector operable to detect ~~the a~~ level of the pilot signal superposed on the downstream electric signal converted by ~~the said~~ second optical receiver; ~~and, wherein said a-level controller is further~~ operable to control ~~the a~~ level of the wireless signal such that the level of the pilot signal detected by ~~the said~~ pilot signal detector is constant; and

~~the said~~ pilot signal generator increases the level of the generated pilot signal so as to narrow a communicable area of ~~the said at least one~~ relay apparatus, and thus allows the level of ~~a the~~ wireless signal transmitted by said one a wireless communication terminal existing in the communicable area to be within the predetermined range.

54. (Currently Amended) A wireless communication system according to claim 50, wherein:

~~the a~~ wireless signal level restrictor is provided in ~~the said~~ control ~~apparatus, apparatus~~ and comprises:

a monitor operable to monitor whether or not ~~the a~~ quality of the upstream electric signal converted by ~~the said~~ first optical receiver fulfills a predetermined condition; ~~and, wherein a level controller operable to,~~ when ~~the said~~ monitor determines that the quality of the upstream

electric signal does not fulfill the predetermined condition, lower said level controller is operable to lower the level of the downstream electric signal which is to be input to ~~the~~ said first optical transmitter so as to reduce an optical modulation index; ~~and, and by reducing the level controller reduces the optical modulation index and thus~~ said level controller attenuates the power of the downstream optical signal so as to narrow a communicable area of ~~the~~ said at least one relay apparatus, and thus allows the level of ~~a~~ the wireless signal transmitted by ~~a~~ said one wireless communication terminal existing in the communicable area to be within the predetermined range.

55. (Currently Amended) A wireless communication system according to claim 50, ~~wherein:~~ wherein the ~~a~~ wireless signal level restrictor is provided in ~~the~~ said control apparatus; ~~and~~ and comprises:

a monitor operable to monitor whether or not ~~the~~ a quality of the upstream electric signal converted by ~~the~~ said first optical receiver fulfills a predetermined condition; ~~and, wherein a level controller operable to,~~ when ~~the~~ said monitor determines that ~~the~~ a quality of the upstream electric signal does not fulfill the predetermined condition, said level controller is operable to lower ~~the~~ a level of a bias current which is set by ~~the~~ said first optical transmitter so as to reduce an optical modulation index; ~~and, and by reducing the level controller reduces the optical modulation index and thus~~ said level controller attenuates the power of the downstream optical signal so as to narrow a communicable area of ~~the~~ said at least one relay apparatus, and thus allows the level of ~~a~~ the wireless signal transmitted by ~~a~~ said one wireless communication terminal existing in the communicable area to be within the predetermined range.

56. (Currently Amended) A wireless communication system according to claim 50, wherein said control apparatus includes ~~the~~ a wireless signal level restrictor that includes a level attenuator operable to attenuate ~~the~~ wireless signal signals to such a level that the upstream optical signal converted by ~~the~~ said second optical transmitter is not distorted.

57. (Currently Amended) A wireless communication system according to claim 50, wherein: communicable areas of ~~the~~ adjacent relay apparatuses ~~adjacent to each other~~ partially overlap each other;

~~the said~~ relay apparatuses each comprise a level adjuster operable to control a gain by adjusting the level of the wireless signal transmitted to, and received from, ~~the said one~~ wireless communication terminal; and

~~the said~~ level adjuster adjusts the level of the wireless signal, such that a difference between (a) a delay time required for a signal transmitted from ~~the said~~ control apparatus to be transmitted via each of ~~the said~~ adjacent relay apparatuses onto ~~the a~~ wireless communication terminal existing in a region where the communicable areas overlap each other, and (b) a delay time required for a signal transmitted from ~~the said~~ control apparatus to be transmitted via ~~the a~~ relay apparatus adjacent to ~~the each said adjacent relay apparatus apparatuses~~ onto ~~the said~~ wireless communication terminal existing in the region where the communicable areas overlap each other, is within a predetermined time period.

58. (Currently Amended) A wireless communication system according to claim 57, ~~wherein,~~ ~~wherewithin~~ two relay apparatuses adjacent to each other ~~is constitute~~ one set, and one set of adjacent relay apparatuses communicate using a frequency which is different from ~~the a~~ frequency used by another set of adjacent relay apparatuses.

59. (Currently Amended) A wireless communication system according to claim 57, wherein ~~the said~~ transmitting/receiving antenna section has a directivity toward ~~a relay apparatus,~~ among one of the two adjacent relay apparatuses, which is said one relay apparatus being connected with ~~the said~~ control apparatus via a longer optical transmission path than ~~the an~~ optical transmission path which connects ~~the said~~ control apparatus and ~~the said~~ relay apparatus including ~~the said at least one~~ transmitting/receiving antenna section.

60. (Currently Amended) A wireless communication system according to claim 57, further comprising an optical coupler operable to split the optical transmission path which connects ~~the said~~ control apparatus and each of ~~the said~~ relay apparatuses, wherein one end of the split optical fiber is connected to ~~the said at least one~~ relay apparatus and the other end is connected to another optical coupler.

61. (Currently Amended) A wireless communication system according to claim 57, further comprising an optical coupler operable to split the optical transmission path which connects ~~the~~ said control apparatus and each of ~~the~~ said relay apparatuses, wherein ~~the~~ said optical coupler splits one optical fiber connected to ~~the~~ said control apparatus into at least a predetermined number of optical fibers, and each of the split optical fibers is connected to ~~a relay apparatus~~ one of said relay apparatuses.

62. (Currently Amended) A wireless communication system according to claim 57, wherein ~~the~~ said level adjuster adjusts the level of the wireless signal such that the delay times are each a maximum delay time tolerated by ~~the~~ said wireless communication system.

63. (Currently Amended) A wireless communication system according to claim 50, wherein:
communicable areas of ~~the~~ adjacent relay apparatuses ~~adjacent to each other~~ partially overlap each other;

~~the~~ said relay apparatuses each comprise an optical signal controller operable to control a delay time of the optical signal transmitted to, and received from, ~~the~~ said control apparatus; and

~~the~~ said optical signal controller controls the delay time of the optical signal, such that a difference between (a) a delay time required for a signal transmitted from ~~the~~ said control apparatus to be transmitted via each of ~~the~~ said adjacent relay apparatuses onto ~~the~~ a wireless communication terminal existing in a region where the communicable areas overlap each other, and (b) a delay time required for a signal transmitted from ~~the~~ said control apparatus to be transmitted via ~~the~~ a relay apparatus adjacent to ~~the~~ each said adjacent relay apparatus ~~apparatuses~~ onto the wireless communication terminal existing in the region where the communicable areas overlap each other, is within a predetermined time period.

64. (Currently Amended) A wireless communication system according to claim 50, wherein wireless signals used by each of ~~the~~ said plurality of wireless communication terminals have at least two different frequencies.

65. (Currently Amended) A relay apparatus connected with a control apparatus via an optical

transmission path and wirelessly communicating with a plurality of wireless communication terminals, ~~the said~~ relay apparatus comprising:

an optical receiver operable to convert a downstream optical signal transmitted from the ~~said~~ control apparatus via the optical transmission path into a downstream electric signal;

a level controller operable to attenuate a level of the downstream electric signal so as to narrow a communicable area of said relay apparatus and to allow a level of a wireless signal transmitted by one of said wireless communication terminals existing in the communicable area to be within a predetermined range;

a transmitting/receiving antenna section operable to transmit the downstream electric signal converted by ~~the said~~ optical receiver to ~~the said~~ wireless communication terminals to as a wireless signal, and receive a wireless signal transmitted from ~~the said~~ wireless communication terminals as an upstream electric signal; and

an optical transmitter operable to convert the upstream electric signal received by ~~the said~~ transmitting/receiving antenna section into an upstream optical signal and transmit the upstream optical signal to ~~the said~~ control apparatus via the optical transmission ~~path; and~~ path.

~~a wireless signal level restrictor operable to attenuate the level of a wireless signal transmitted or received by the transmitting/receiving antenna section such that a receiving level of the wireless signal received by the transmitting/receiving antenna section is kept within a predetermined range.~~